

The Big Crop



Lack of certified sweet potato

Uganda's sweet potato production has reduced from 2.8 million tonnes in 2010 to 1.8 million tonnes

By Prossy Nandudu

Sweet potato is one of the root crops that can shield a family from starvation during dry spells. They are hardly affected by the dry spell and can be cultivated with minimal inputs.

These characteristics make sweet potato a suitable crop for mitigating food insecurity. They can be eaten without sauce and the vines can be sold as seed or animal feeds.

Botanically known as Ipomea batatas, sweet potato is the leading food crop according to the ministry of agriculture, animal industry and fisheries. They take three to four months to mature.

First cultivated in central and western Uganda prior to 1900, especially on the slopes of Mt Rwenzori, but moved to the north.

By the 1950s, sweet potato accounted for 9% of Uganda's crops, ranking behind millet, bananas and cassava as the nation's most important food crops. Estimated production is 4.5 tonnes per hectare, according to the agriculture ministry.

According to the Food and Agriculture Organisation, sweet potato is the third most important root crop in the world. Uganda is the fourth largest producer of the crop globally. In Africa, Uganda is the third largest producer of sweet potatoes at about 1.8 million tonnes annually after Nigeria and Tanzania.

Uganda's sweet potato production has reduced from 2.8 million tonnes in 2010 to 1.8 million tonnes.

The low production is attributed to a combination of factors, including socio-economic considerations, such as lack of farm labour and rural to urban migration. Other factors are declining soil fertility, shortage of improved varieties, as well as planting materials, frequent droughts, diseases and pests.

Nutritious varieties

Through the years, farmers have moved from the original varieties like Kawogo and Kyebandula to growing the yellow and purple fleshed varieties. In terms of nutrition, the orange-fleshed varieties have been enhanced with vitamin A. They are suitable for children and pregnant women. The purple-fleshed potatoes have on the other hand, have elements that kill cancer-causing cells due to their purple colour, but research is still ongoing.

The purple fleshed sweet potatoes

have a compound called anthocyanin which helps in fighting diseases such as cancers, lowers high blood pressure, increases dietary fibre intake in the body. It also lowers cholesterol levels and is responsible for the purple colour. However, having purple flesh does not mean that the variety is genetically modified variety, explained Dr. Benard Yada, head of Sweet potato programme at the National Crop Research Resources Institute (NaCCRI).

Unfortunately, not much attention has been invested in this wonder crop in terms of availing quality seeds or vines that are disease-free and can be accessed by smallholder farmers easily. Instead, farmers get seed from recycling old vines, according to Margaret McEwan, the seed systems component leader at the International Potato Centre an organisation located in Naguru in Kampala.

"The challenge with recycling of vines is that there could be a quick build-up of sweet potato diseases and pests in the planting material. When these build up, the harvest of the varieties reduce sometimes leading to 100% yield loss in a short period of time," McEwan said.

The other challenge is the long dry spell that is no longer predictable due to the changing weather patterns. This makes it impossible for sweet potato fields to sprout the vines, until the rains come. This normally leads to delays in planting of the crop by the farmers.

This is what sweet potato researchers and promoters of the crop are now addressing, by training sweet potato seed multipliers to produce sufficient quantities of quality seed or planting material to meet the demand for planting material at the beginning of every season.

This is being done in partnership with National Agricultural Research Organisation (NARO) through the National Crop Resources Research Institute under the Root Crops Programme and first being piloted in Mpigi, Teso region and Gulu, before spreading it to other parts of the country.

McEwan said they are targeting farmers who access the seed from their neighbours or pick it by the roadside by extending quality vines to them through fellow farmers.

Solving the challenges

"So what we are trying to address is



A potato garden on trial at Namulonge. Farmers should check vines before planting, to control the transfer of pests to their gardens



Sweet potato leaves showing signs of the virus disease

Sweet potato is the third most important root crop in the world. Uganda is fourth largest producer of the crop globally.

the problem of getting disease-free planting materials, which have to be delivered through an efficient seed system so that farmers can access disease-free seeds of better varieties in time," said McEwan.

This is being done through training farmers to become seed multipliers in villages. This way, the sweet potato seed can easily be accessed by fellow farmers without incurring extra

transport costs.

After training, farmers will sell the seeds at a fee, ranging from sh15,000 a bag to sh50,000, depending on the season.

However, participants at the seventh consultative meeting of different countries to share experiences on how they addressing challenges in the sweet potato seed systems called for development of inspection standards that will guide the multiplication process.

The meeting, held at Colline Hotel in Mukono recently, attracted 11 countries including Ethiopia, Rwanda, Nigeria, Mozambique, Malawi, Kenya, Tanzania, Rwanda, and Uganda among others.

It also attracted the private sector, Makerere University, Ministry of Agriculture Animal Industry and Fisheries and researchers from NARO.

Sweet potato seed standards

A Makerere University lecturer from the faculty of agriculture, Prof. Ssetumba Mukasa, said the sweet potato seed inspection guidelines for Uganda has been completed and pretested. What is pending is the ratification of the guidelines and use by the agriculture ministry, so that seed inspectors can start using them to inspect planting materials or vines.

The ideal sweet potato seed systems emphasises quality of planting materials, which should be delivered in time and in the right amounts in addition to improved varieties.

"Currently, the seed system is characterised with diseases, pests, low multiplication of new seed compared to cereals and only 10% of farmers can access quality planting materials from research stations,"

Ssetumba said.

Dr Yada explained that they have worked with Makerere University, agriculture ministry and the International Potato Centre and HarvestPlus to develop the inspection standards.

Such a move will help ensure that the planting material sold by the seed multipliers is of high quality and of the right varieties, he said.

The programme is being supported by NARO. Thus all seed coming to the district will first be inspected by the district agriculture officer who will look out for a permit from NARO's seed inspectors and an arrest will be effected if there are no permits. The planting materials will also be destroyed.

Those with clean vines have been relying on positive selection. The farmers examine the leaves, to look out for symptoms of diseases and pests on them with assistance from researchers. Countries that have sweet potato standards in place include Kenya, Rwanda, Ethiopia, and Tanzania among others.

Pests and diseases

Paul Musana, a research assistant and crop entomologist at NaCRII explains that the white fly and aphid causes the sweet potato virus disease. They transmit the disease called the sweet potato virus.

While sweet potato weevil can cause up to 100% yield loss depending on the weather condition, at the moment, there are no resistant varieties in the country, Musana explained.

"What we have is a land race or traditional variety called the new kawogo that has shown a level of tolerance to the weevil, presenting a big challenge in Africa where no variety resistant to the weevil has been produced," Musana explained.

Agnes Alajo, a senior technician at NaCRII says sweet potatoes are mainly affected by the sweet potato virus disease and Alternaria blight. Sweet potato Alternaria is a fungal disease, transmitted through spores that can easily be moved by wind, and rain splashes.

The virus is capable of causing



seed failing production



A farmer excited about his potato harvest

Sweet potatoes pay off

Steven Angudubo, an agricultural economist under Root Crops Programme at NaCRRI, says sweet potatoes can be grown three times a year, which is assurance of food for both home consumption and sale. According to research, with a little investment of about sh100,000 in half an acre, one is able to harvest more in terms of food and vines for money. If a farmer invested in half an acre, he will have to set aside money for slashing, about sh3,000 per piece and this can be done four times which is sh12,000. To make the soil tender, could cost sh6,000 and this can be done twice, which is sh12,000 as well. Since farmers do not invest in buying seed, they could borrow from neighbours and the only cost could be transporting them. One could spend sh5,000 while those using a motorcycle.

100% yield loss while Altenaria can cause yield loss of about 2.5 to six tonnes per hectare.

What brings the pests?

Musana explained that pests attack gardens based on the environment conditions. For example, higher

temperatures favour the breeding of pests. That is why the weevil is mainly found in North-eastern Uganda and West Nile due to higher temperatures compared to the western region, which is relatively cooler.

He adds that the weevil spreads through proximity. If a farmer's crops are infected, chances are high that it can move to the



Products of sweet potatoes

neighbouring farm.

How pests attack the potatoes

The weevil attacks sweet potatoes at an early stage. First, they feed on the leaves (forage), lay eggs on them, which hatch into larvae. The larvae then eats up the leaves stunting growth.

According to Musana, the weevils also make tunnels and use cracks that occur due to higher temperatures to enter the roots which they feed on, hence causing 100% yield loss. The roots or vines damaged by the weevil cannot be fed to domestic animals. The weevils produce a toxin that is harmful to the health of animals.

Control measures

Since there are no resistant varieties, but traditional methods, like early harvesting, weeding to cover the cracks that the weevils use to enter into the soil to eat the roots. Other methods are timely planting to evade the onset of higher temperatures which favour weevil development and inspecting the vines before planting will help control the pest.

Symptoms

When the vines are infected with the virus, the plants become yellow. The yellow leaves curl and have a mosaic appearance (dark green mixed with light green and yellow). With time, the plant becomes stunted and in severe cases, the plants fall off.

In addition, plants develop black lesions, on the stem, leaves, and vine. As they enlarge, leaves become yellow and fall off.

At the moment, there is no control for these diseases, but farmers are still using the traditional methods to control.

TIPS & TRICKS

Avoid damaging the sweet potatoes while harvesting

How to grow sweet potatoes

They can be grown in ridges or by heaping, which is the common practice. However, scientists say ridges save more space than heaps. They also allow proper weeding and harvesting. Sweet potatoes mature in 90 to 170 days.

Post-harvest handling practices

Sweet potatoes can be stored up to nine months in the developed world. Under our conditions, sweet potatoes can be stored in cool

environment for up to one-and-a-half weeks.

According to Dr Bernard Yada, farmers should also wash the potato roots, dry them and keep them in cool dry rooms in form of potato chips or amukeke.

Sweet potato roots can stay for one week with minimal post-harvest deterioration.

Harvesting should be done using fairly using blunt implements to minimise root damage through cuts as this will lead to rotting.

Also, they should packed well to minimise bruises during transportation.

Observing weed management to prevent disease moving organisms from settling there so as to find their way in the potato heap, beyond clean seed, plant on time.

Farmers should also use cultural methods, early harvesting. They should also weed and hill up to cover cracks that weevils use to enter into the soil, to eat the roots (sweet potatoes).

Sweet potato chips and flour

Other than consuming the sweet potatoes as steamed food, there are other products that one can produce from sweet potatoes including chips and flour.

Requirements

- Mature sweet potato roots
- A clean area ideally raised working surfaces.
- Large plastic containers, preferably 10- to 20-litre buckets with lids
- Supply of clean water
- Knives for peeling and chipping
- A solar drier

Procedure

Choosing the roots

The roots are harvested or purchased and sorted. Use the undamaged and mature potatoes – three to four months for the early maturing varieties and five to six months for the late maturing ones.

The potatoes are washed in clean water in large buckets, with water being changed as frequently as required.

After washing, the potatoes are drained by being placing them on nylon sacks.

The washed potatoes are peeled and chipped to uniform size (3-6 mm thick) manually, with sharp knives.

Sweet potato chips are spread evenly on trays and loaded into a solar drier (can also be sun dried but the quality will be lower than that of a solar drier), dried for about eight hours until brittle, according to the sun's intensity.

The dried chips are packed in polyethylene bags and stored in buckets until further processing to flour.

The potatoes are milled, using a hammer mill (village "posho" mill) into flour.

The flour is packed in strong (thick gauge) black polythene bags, Labelled to state source, date of manufacture and expiry date (after six months).

The bags are placed into buckets to protect the flour from light.

If orange fleshed sweet potato is sliced and subjected to four different treatments

- Slicing while leaving the potatoes in open air
- Slicing and immersing the chips in water
- Slicing and immersing the chips in water mixed with sodium meta bisulphite
- Un-peeling the roots followed by slicing
- Steaming the potatoes for 25 minutes before slicing and drying

Treatment one

The chips will brown even before being put in the drier, the flour made from the dried chips subjected to this treatment will be discoloured due to oxidation. The orange colour will not be pronounced and the flour will have a brown coloration.

Treatment two

The orange colour leaches into the water and the flour made from these chips is nearing to white; the smell of the OFSP will though still be pronounced. However the vitamin A is fat soluble and will not be lost in the soaking water

Treatment three

Chips immersed in water with Meta bisulphite will retain the orange colour. The flour made from these chips will be most attractive.

Treatment four

The peeling of the orange sweet potato is proved to be rich in nutrients, however on drying the peel will tend to blacken and the black substances will also be manifested in the flour which will makes the flour unattractive.

Treatment five

Steaming the potatoes for 25 minutes before slicing and drying will retain more orange colour and hence the carotenoids as compared to slicing and drying without steaming. Slicing the potatoes and drying them immediately will retain as much carotenoids as pre-steaming. Therefore, we prefer slicing and drying without steaming because it saves energy and it is convenient in terms of labour. The flour will also keep better than the fresh potatoes.

The products that can be made from the potato flour included; cakes, biscuits, composite flour, buns, cookies and doughnuts.

Compiled by Geoffrey Ssemperi, an agronomist